Parliamentary Group and Individual Voting Behaviour in the Finnish Parliament in Year 2003: A Group Cohesion and Voting Similarity Analysis[+]

Antti Pajala[*]

Doc. Pol. Sci., Department of Political Science, University of Turku. E-mail: anpaja@utu.fi

Aleks Jakulin

Faculty of Computer and Information Science, University of Ljubljana. E-mail: jakulin@acm.org

Wray Buntine

Helsinki Institute for Information Technology. E-mail: wray.buntine@hiit.fi

Abstract

Although group cohesion studies are rather common elsewhere, the last analyses of the Finnish parliament Eduskunta were published in the 1960s. This article provides, firstly, a fresh group cohesion analysis using the Agreement Index, which is a modified version of the classic Rice index. Secondly, two advanced voting similarity analyses, together with a new easy-to-understand way of illustrating the results, are provided. Where the Agreement Index operates at the parliamentary party group level, the voting similarity analyses are able to analyse and illustrate the individual MP level. The article is partly methodological in testing the voting similarity methods, however, it also provides insight into the recent voting behaviour within Eduskunta.

1 Introduction

When voting takes place in parliaments' plenary sessions, one important question is whether the division of MPs into parliamentary party groups is able to explain the voting behaviour. In other words, do the MPs vote along their respective party lines? And if not, how do they vote? Traditionally, the voting behaviour has been studied using the Rice (1928) cohesion index (or modifications of it), but these group cohesion calculations could, and perhaps should, be accompanied with other methods in order to produce a richer picture of parliamentary voting behaviour.

One major limitation of the Rice cohesion index (1928) is the following: while the

[+]The authors wish to thank the archives and the information services of Eduskunta for their most valuable help in collecting the data. This work is supported by the Academy of Finland.

[*]Corresponding author.

index is capable of numerically reporting parliamentary party groups' voting cohesion, it is not capable of providing any details about individual voting. In other words, the index is limited group level information only. Tools to analyse the individual level details do exist, but the recent European cohesion studies do not apply them. This study, in turn, provides analyses in both levels: firstly, by using a modification of the Rice cohesion index, and secondly, by applying two data mining and visualization tools to analyse individual level voting similarities.

The group cohesion and voting likeness analysis approaches a voting body with two different postulates. The cohesion postulate is that the voter groups are known or defined before the actual analysis. The rate of the cohesion within the already known groups is then calculated. The voting likeness postulate, in turn, is that the voter groups are not defined. In fact, we assume that in the beginning we do not know anything about the voter groups. Instead, it will be the MP by MP voting likeness comparisons that will identify the groups empirically. Within the voting likeness analyses there are two further variations: in the first one, a voter can belong to only one distinctive voter group (or cluster). In the second variation, latent variable analysis is used to dig up the underlying voting blocs (groups) in the voting body. An MP can now belong to multiple blocs, and the analysis reveals the intensity (or probability), with which an MP is a member of each of these blocs.

Stuart A. Rice spawned a huge scholarly literature on the study of group cohesion. One of the main reasons for the continuing popularity of the Rice cohesion index is that it is easy to calculate mathematically. Rice (1928) was also interested to explore reasons behind the cohesion results, i.e. the individual level voting. For example, who were the deviating MPs within the parliamentary groups causing the low cohesion scores? Already in his 1928 book *Quantitative Methods in Politics*, Rice does suggest a method for sub-group voting likeness analysis. The problem, however, was that the analyses were mathematically very hard to calculate. Few years later, Herman Beyle (1931) criticized and further developed Rice's ideas. A discussion as well as an application of the Rice-Beyle voting likeness method is David. B. Truman's (1959) study of the US Congress. Nowadays, we do not face Rice's computational limitations nearly as severely as in the 1920s, but recent cohesion studies still fail to present any

accompanying individual level analysis.

The authors are not aware of any individual level voting likeness analyses regarding Eduskunta, and regrettably almost the same applies to group cohesion analyses. Wiberg (1989) has characterized the situation rather well by noting that the few cohesion studies done in the past can nowadays be regarded more or less anecdotal. These historical works are Pekka Nyholm's (1961) PhD thesis and a successive analysis some years later by Nyholm and Hagfors (1968). Nyholm also published two rather short analyses in the Finnish journal Politiikka (Nyholm 1959; 1969). Unfortunately, the data Nyholm applied was even older, covering parliamentary years from 1930 to 1954. Two further studies can be seen as investigating group behaviour in Eduskunta. Both Heiskanen (1963) and Sänkiaho (1966) approach the group behaviour, although in a more general fashion compared to Nyholm. The only known current cohesion study is Mellanen's (1999) unpublished MA thesis, in which he analysed Eduskunta's group cohesion during 1995-1998 using the Rice cohesion index. The study quite straightforwardly followed the footsteps of Nyholm.

Among the group cohesion studies most have focused on the US Congress. A rather recent example is the study by Cox and McCubbins (1991), covering years from 1933 to 1988, and many more can be found in Collie (1985). Probably the second largest amount of studies have analysed group cohesion in the European Parliament, and include, for example, Attiná (1990), Hix et al. (2004, and the references therein) and Raunio (1996; 1999). Among the European national parliaments, some of the most recent studies include Saafeld (1990) regarding Germany, Asbjorn (1999; 2001) and Svensson (1982) regarding Denmark, Clausen and Holmberg (1977) regarding Sweden, Lanfranchi and Lüthi (1999) regarding Switzerland, Ágh (1999) regarding Hungary and Sánchez de Dios (1999) regarding Spain. As in many other group cohesion studies, worth mentioning is the Özbudun (1970) book, which reports parliamentary party cohesion in some western democracies until the late 1960s.

Research problems

First, we will examine the basic environment. We need to know how the Eduskunta voting system functions. Moreover, we need to know the structure of the votes, i.e.

what is voted upon, and how did the votes turn out? With this information we can analyse the voting cohesion within the parliamentary party groups using the Agreement Index. Earlier studies and observations from the Finnish media both point to the direction that the cohesion should be rather high. We can also verify Raunio's (1996) claim that the cohesion would not have changed from the days of Nyholm (1961; 1969). Moreover, as the cabinet is a coalition (and parliamentarism is exercised in Finland), we expect the coalition party groups to have higher cohesion than opposition groups. Lastly, we compare Eduskunta's cohesion results to other countries respective findings.

Applying the voting similarity method together with the latent variable analysis, we can approach another, more general question: do party groups explain the voting behaviour well enough, or are there blocs inside parties or other blocs that would explain the voting more accurately? The voting similarity analysis will compare every pair of MPs, perform clustering, and produce a dendrogram illustrating the clustering. The related question is whether the clustering of MPs follows the party grouping. With respect to the latent variable analysis, the number of components needed to best describe Eduskunta's voting structure is first established. The division of MPs into components will reveal possible nuances in the previous clustering, and provide a complementary analysis: we will analyse possible sub-blocs within the party groups and in the cabinet coalition.

The article is organized as follows: the next section provides a basic description of Eduskunta. It also introduces the plenary voting system of Eduskunta, and studies the structure of votes taken in 2003, i.e. how many and what kind of votes took place. Section 3 introduces the applied research methodology to study the votes. These are the cohesion analysis applying the Agreement Index, the voting similarity analysis applying a clustering algorithm for illustration, and the latent variable analysis studying the nuances of the voting similarity. Section 4 presents and analyses the results obtained using the various research methodologies. Section 5 concludes with a discussion on the results vis-a-vis the research questions.

2 Eduskunta and its' voting system

Before the methodological section below, we shall first introduce the Eduskunta, and its voting system. We shall also provide some descriptive statistics regarding the issues and votes. While our main analysis concerns only the year 2003, the statistics also provide some comparative information with respect to the previous parliamentary term of 1999-2002.

The Finnish Constitution does not recognize political parties, let alone parliamentary party groups, which *de facto* rule in the Eduskunta. Moreover, on the independence of the MPs, the Constitution (2000, 29§) states: ”A representative is obliged to follow justice and truth in his or her office. He or she shall abide by the Constitution and no other orders are binding on him or her”. In practice, as mentioned above, the activities in Eduskunta are organized through the party groups. Most of the party groups have written rules and sanctions for breaking the rules.[1]

The Eduskunta consists of 200 MPs elected for a four-year term. 2003 is the first year in the 2003-2006 term. We focus only on the plenary sessions, although votes take place elsewhere, as in the various committees. As the speaker cannot vote, the total number of votes is 199. The MPs have three voting options: 'yes', 'no' or 'abstain'[2]. In most cases, the parliament approves a legislative proposal or other issues without a vote. When a counter proposal or an amendment ('ponsi' in Finnish language) is proposed, and a vote is needed, it is up to the speaker of Eduskunta to decide whether or not the individual MP votes are recorded to the printed session minutes (roll-call voting). Usually, the important votes, such as the final considerations of law proposals, are roll-call votes. Eduskunta's electronic (push-button-based) voting system, however, records all votes. These results can be obtained from the Eduskunta's website (for some very recent years). Our analyses include all votes that took place during the 2003 parliamentary year.

The parliament can vote upon different kinds of issues. The issues are processed either inside or outside the official legislative schedule. Issues processed outside the

[1]The information about the party groups here is according to Wiberg (2000). It should still be rather up-to-date, even after the Constitution change of March 1st 2000. Also, for more details on Eduskunta, Wiberg (2000) and the references therein are a valuable source. See also Wiberg (1989).

[2]In Finnish language the options are 'kyllä', 'ei' and 'tyhjä', respectively. If (paper) voting tickets were used, the last option is equal to an empty vote ticket.

official schedule are, for example, official reports or announcements from the cabinet (valtioneuvoston selonteko and valtioneuvoston tiedonanto), or special questions from the parliament opposition to the cabinet (välikysymys), which lead to a vote of confidence. The former type can be approved or rejected with a simple majority. The latter type *has to be* supported by simple majority, after the cabinet has answered. Otherwise the situation is interpreted as the cabinet not enjoying the confidence of the parliament, in which case the cabinet resigns. The second issue type is the officially scheduled legislative votes. Depending on the type of the proposal, some laws are considered only once (with possible votes), however, the more important ones have to be considered twice in separate sessions.

Multiple voting thresholds apply: firstly, a simple majority is the majority of the votes cast. So, when the number of 'yes' votes is greater than the number of 'no' votes, it suffices for a passage. Secondly, for a few special cases, the most important being changing the constitution, a 2/3 majority from the votes cast is required. Thirdly, if a constitutional change is to be declared urgent (and thus decided within the ongoing parliamentary term), a 5/6 majority is required. In 2003, only simple majority votes took place.

Table 1. The number of issues and votes in Eduskunta's plenary sessions between 1999-2003

Year	***1999***	***2000***	***2001***	***2002***	***2003***
No. of issues	2014	1631	1873	2045	1352
No. of issues with votes	36	60	58	67	46
Issues with votes (%)	1.8	3.7	3.1	3.3	3.4
No. of votes within issues	249	253	271	481	491
No. of votes, where 'no' > 'yes'	4	7	4	8	1

Note: Issues included in the table are of types: LA, HE, VNS, VNT, VK, K, M, VJL, TAA, PNE, TA, LJL and LTA. Only these issue types created votes during 1999-2003. Other types are excluded, such as a substantial number of discussion proposals (keskustelualoite).

From Table 1 we can see the number of issues processed, the number of issues with votes and the number of votes within the issues in Eduskunta between 1999-2003. Year 2003 seems to differ from the previous parliamentary term in two respects.

When compared to most of the previous four years, the amount of issues was considerably lower, but there were more votes. What is perhaps even a bit surprising is that only 3.4% of all issues required voting. These few issues, in turn, do require lots of votes. The trend seems to hold through the years with the exception of 1999, when only 1.8 % of the issues were voted upon. The last row in Table 1 reveals that only a couple of votes in every year are decided against the speakers' proposal, which usually follows the cabinet vs. opposition setting. The 'yes' votes (cabinet proposal) practically almost always win, as the cabinet coalition has a safe majority of the seats.

Obviously, it is the case that one proposal can require more than just one vote. Therefore, a more detailed insight to the votes is needed. For this purpose, consider the structure of the votes reported in table 2.

Table 2. Structure of votes during 1999-2003 in Eduskunta's plenary sessions

Year	***1999***	***2000***	***2001***	***2002***	***2003***
All votes	**249**	**253**	**271**	**481**	**491**
Inside vs. outside of the official legislative schedule					
Inside schedule	**245**	**244**	**262**	**465**	**454**
Outside schedule*	**4**	**9**	**9**	**16**	**37**
Budget vs. non-budget votes					
Budget total**	**189**	**141**	**194**	**347**	**376**
Budget total (%)	75.9	55.7	71.6	72.1	76.6
Main budget	179	133	175	332	339
Extra1 budget	9	6	17	8	32
Extra2 budget	1	2	2	7	5
Non-budget total	**60**	**112**	**77**	**134**	**115**
Non-budget total (%)	24.1	44.3	28.4	27.9	23.4
Votes by the procedure followed					
One consideration	190	**143**	**199**	**353**	**378**
2/3 considerations total	**53**	**84**	**63**	**111**	**76**
1st	1	60	40	86	47
2nd	39	23	23	25	29
3rd***	13	1	-------	-------	-------

* These include VK, VNS and VNT issues

** Budget votes are inside the official schedule (one consideration)

*** The constitution was changed in 2000, after which there are only two considerations

The first and immediate observation is that a huge majority of the votes concerns the state's budget for the next year (2004). The budget is a single consideration law decided yearly, usually in December, which also implies that the majority of the votes take place in the end of each year. In all years, except in 2000, the budget votes are well over 70% of all votes. Secondly, there are only few votes outside the official legislative schedule, in 2003 only 37 votes, so almost all votes concern laws. Thirdly, when compared by the procedure used (laws), we notice that the first consideration seem to produce more votes compared to the second (before 2001 also the third) consideration. Year 1999 seems to be an exception to the rule.

Lastly, we shall give a short description of the political climate in 2003. Elections in March 2003 resulted in a major change in the cabinet, and the already eight years old 'rainbow' coalition (KOK, SDP, VAS, VIHR, R) saw its end.[3] From the previous cabinet parties, SDP was able to gain two seats (into 53 seats), KOK considerably lost six seats (40), while the main opposition party KESK basically won the elections gaining seven more seats (55). As a result, the new prime minister was nominated from KESK, and the other two cabinet parties became SDP and R, although R suffered a loss of three seats (9). Thus, the cabinet coalition enjoys a majority in the Eduskunta.[4]

3 Research Methods

Group cohesion and the Agreement Index

From parliamentary votes all over the world we know that various parliamentary party groups tend to vote similarly. In practice, as we know, it seems to be more a rule than an exception that the groups do not vote identically. The group cohesion indices

[3]Party abbreviations: KD = Christian Democrats, KESK = Center Party, KOK = Conservatives, PS = True Finns, R = Swedish Peoples Party, SDP = Social Democrats VAS = Left Wing Alliance, VIHR = Greens

[4]For the 2003 election results see Nurmi and Nurmi (2004).

measure the rate of 'not indentically'. Stuart A. Rice (1928) was one of the first to develop such an index. As his index is limited to only 'yes' – 'no' options, and in Eduskunta the MPs have three voting options, we use a modification proposed by Hix et al. (2004), which allows for the third distinct option 'abstain'. Hix et al. call their modified index the 'agreement index' (AI_i)[5]. Let us denote Y_i as the number of 'yes' votes cast by a group on a given vote, N_i the number of 'no' votes and A_i the number of 'abstain' votes. Then, formally, the AI_i can be calculated as

$$AI_i = \frac{\max\{Y_i, N_i, A\} - \frac{1}{2}\left[(Y_i + N_i + A_i) - \max\{Y_i, N_i, A\}\right]}{(Y_i + N_i + A_i)}$$

As an example, if a group casts 7 'yes', 2 'no' and 2 'abstain' votes, then the Agreement Index takes the value of (7 – 0.5 * [11 - 7]) / 11 = 0.45. If a group casts 30 votes, and all the votes are 'yes', then the group cohesion is one (the highest value). If a party casts 30 votes, and 10 votes are equally divided among the three options, the cohesion is zero (the lowest value).[6]

Voting similarity and latent variable analysis

Voting similarity analysis

Considering two voters and ignoring the cases when at least one of them did not cast a vote, there can be four joint outcomes: (1) *yy* - both voted 'yes', (2) *nn* - both voted 'no', (3) *yn* - the first voter voted 'yes', the second 'no', and (4) *ny* - just the opposite. We will use the count #(*nn*) to indicate the number of votes with outcome *nn*, while the sum of counts for all four outcomes is *N*.

There are two basic probabilistic models that describe the voting process of two voters. In the first we assume that the voters are not voting independently, either because of similar judgement, similar opinion or an explicit agreement. As an

[5]Hix et al. note also another index allowing three voting options by Attiná (1990). An undesirable feature of this index, as well as the original Rice index, is that they can produce negative results. The agreement index, in turn, is scaled to produce values only between zero and one.

[6]Note that the value of AI_i is not zero when a group casts 10 'yes' votes, 10 'no' votes and zero 'abstain' votes. In this case, the AI_i has a value of 0.25. Keep in mind that the votes are completely divided between two, not all three options.

example, the probability of outcome *nn* in the dependence-assuming model is estimated as $p_{nn} = \#(nn)/N$. The second model assumes that the votes of both voters are *independent*. The probability of a joint outcome *nn*, p_{nn} is therewith a product of the probability that the first voter voted *n*, $p_{n*} = p_{nn} + p_{ny}$, and the probability that the second voter voted *n*, $p_{*n} = p_{nn} + p_{yn}$. The dependence-assuming model predicts the probability of the joint outcome *nn* as $\pi_{nn} = p_{nn}$, while the independence-assuming one as $\varphi_{nn} = p_{n*}\, p_{*n}$.

The entropy of a set of outcomes X given its probabilistic model π is $H(\mathrm{X,Y}) = -\sum_i \pi_i \log_2 \pi_i$ and is measured in bits. The higher the entropy, the less constrained and the harder to predict is the phenomenon it describes. If X and Y are the two voters, the entropy of the dependence-assuming model π is $H(X,Y)$, while the entropy of the independence-assuming model φ is $H(X) + H(Y)$. Here, $H(X)$ is based on only two outcomes with probabilities p_{n*} and p_{y*}. Model φ cannot be more constrained than model π, which can be noted as $H(X,Y) \leq H(X) + H(Y)$. *Mutual information* is the difference of the two models' entropies $I(X;Y) = (H(X) + H(Y)) - H(X,Y)$. If the mutual information is zero, there were no additional constraints in the joint model: the behaviour of both voters was independent. But if the mutual information is high, there was considerable dependence between the two voters. This means that we know something about the vote of one voter if the other vote is known.

Mutual information is always greater or equal to zero, and less or equal to the joint entropy $H(X,Y)$. We can therefore express it as a percentage of $H(X,Y)$, and the larger it is, the more entangled the two models. Based on this notion, Rajski's distance (Rajski, 1961) can be defined as follows: $d(X,Y) = 1 - I(X;Y)/H(X,Y)$. Using this metric we can construct a dissimilarity matrix, and summarize it in a compact way with clustering algorithms.

Latent Variable Analysis

Another basic approach for investigating multi-dimensional data, such as a voter's

voting patterns, is the construction of characteristic or typical voting patterns. Similarity is a pair-wise perspective, comparing pairs of voters, whereas characteristic patterns offer a complementary holistic perspective. We now model the full set of votes for each voter using several *voting patterns*. A voting pattern gives the propensity to vote in a particular way and assumes independence between individual voters' votes.

One simple model of this kind is to break up the parliament into two blocs, cabinet and opposition, say, and to consider the probabilities for these separately with voting patterns. This, of course, is uninteresting. We are interested in the nuances that exist beyond this basic two-party model. Are there blocs within the opposition? Are there blocs within a particular party? Is there an independently minded bloc across party lines? Since most voters tend to vote with their party as a rule, these nuances need to be additions to some basic party modelling.

A simple additive model for blocs is as follows: each voter has a proportional membership in K blocs, given by a probability vector $(f_1,...,f_K)$ that sums to one. Each bloc k has its own voting pattern represented as a vector $p_{i,y}{}^k, p_{i,n}{}^k$ for $i \in Votes$. The probability for a particular subset of votes $Votes' \subseteq Votes$ given by this pattern is v_i: $i \in Votes'$ is $\prod_{i \in Votes'} p_{i,vi}$. Thus a voter's voting probabilities can be modelled as independent probabilities: for the i-th vote this gives $\sum_{k=1,...K} f_k\, p_{i,vi}{}^k$ and as before we multiply these values together for the likelihood of the voter's full set of votes given the model: $L = \prod_{i \in Votes'} \sum_{k=1,...K} f_k\, p_{i,vi}{}^k$.

This simple style of an additive model for blocs has a rapidly growing history in applied statistical modelling and appears under many names: grade of membership (Woodbury and Manton, 1982) used for instance in the social sciences, demographics and medical informatics, genotype inference using admixtures (Pritchard et al., 2000),

probabilistic latent semantic indexing (Hoffman, 1999) and multiple aspect modelling for document analysis, while a Poisson variant is referred to as non-negative matrix factorization (Lee and Seung, 1999) in image analysis.

These methods and models all correspond to a discrete version of one of statistics most common tools: principal component analysis, but with the least squares fitting procedure replaced by discrete fitting algorithms. The voting patterns correspond to the components. The methodological challenge in this approach is to deal with the unknown bloc proportions ($f_1,..f_K$) for each voter. These are called *latent* or *hidden variables* and are distinct for each voter. Thus they provide an additional (K-1)*101 free variables, one for each voter and one for the outcome, that a naive fitting procedure could potentially use in optimization to over fit the data and thus produce poor models.

While originally considered a non-parametric statistical method, recent approaches model all the parts of the problem with probabilities. One can estimate the voting patterns and the bloc membership proportions for each voter using a general statistical algorithm called Gibbs sampling (Geman and Geman, 1984): Because we do not actually know the true values for either the bloc voting patterns or each voters' bloc proportions, we simply resample each parameter in turn from the voters' actual voting records, conditional to other parameters of the previous iteration. Pritchard et al. (2000) show that sampling and averaging all the variables during this process provides good estimates of the quantities involved.

4 Results and analyses

Group cohesion

Table 3 presents the group cohesion results. The rows are different sub-groupings of

the votes. Regarding all votes in row 2, the most cohesive group is the Swedish people's party R (.965). Not far behind are the other two cabinet groups KESK (.961) and SD (.921). The opposition groups are less cohesive, and only PS (.948) is at the level of the cabinet groups. Other groups KD (.866), VAS (.861), VIHR (.851) and KOK (.817) have considerably lower cohesion values. Also columns 10 and 11 show the same phenomenon, when the cabinet (.864) and opposition (.572) are merged as one bloc. The cabinet, as expected, is much more cohesive. Finally, the last column reports the cohesion of the parliament as a whole (.639) calculating the cohesion from the total 'yes', 'no' and 'abstain' votes.

From all the sub-groupings in rows 3-6 the most interesting finding is that the second (and final) considerations seem to raise the cohesion of all groups (with the exception of R). Noteworthy, these votes are usually roll-call votes. These votes are, obviously, also the most important ones. Note that the PS is in this case completely cohesive.

Table 3. Eduskunta's political party groups' Agreement Index values in year 2003

	KD	***KESK***	***KOK***	***PS***	***R***	***SD***	***VAS***	***VIHR***	***Cabinet***	***Oppos.***	***Whole parl.***
All Votes	.866	.961	.817	.948	.965	.921	.861	.851	.864	.572	.639
All votes minus Budget votes	.904	.955	.895	.936	.953	.958	.955	.886	.858	.573	.613
Only budget votes	.849	.964	.781	.953	.970	.905	.819	.834	.867	.572	.651
Only 1st considerations	.929	.937	.907	.904	.944	.940	.973	.917	.812	.558	.556
Only 2nd considerations	.942	.974	.938	1	.926	.975	.936	.861	.865	.566	.620

Table 4 has 10 categories of cohesion values, and reports the number of votes for every category in every group. Row two shows that the majority of the votes of the party groups always fall into the first category (.9>x>1). In the last row we can see that only one group (SD) for only one vote achieved a cohesion value lower than 0.1. The same applies for one vote to the parliament as a whole. In more detail, we can see that KOK, VAS and VIHR have many cases in many categories. While the mode of the cases for the party groups is always in the first category, the mode of the cabinet

coalition is in the second, and the mode of the opposition is in the sixth one. Considering the parliament as a whole, the mode of the cases is in the fourth category.

The case of the PS group reveals an annoying property of the Agreement Index (and in the original Rice index as well): The PS group has three seats, and if one of the three MPs disagrees with the two others, the index value (0.5) diminishes dramatically, as the number of cases in the fifth category shows. If one MP is not present and the two others disagree, the resulting value (0.25) is in the eighth category. If one MP defects in a large group, say KESK, the resulting AI value hardly changes at all. Hence, the size of a group has a huge impact on the result, and the AI index should be modified to take this phenomenon into account by using a proper probabilistic interpretation of the number of cast votes.

Table 4. Eduskunta's political party groups' Agreement Index value categories in year 2003 (all votes)

	KD	***KESK***	***KOK***	***PS***	***R***	***SD***	***VAS***	***VIHR***	***Cabinet***	***Oppos.***	***Whole parl.***
.9>x>1	322	432	229	445	418	393	338	267	196	5	7
.8>x≥ .9	0	45	92	0	52	45	23	73	220	67	83
.7>x≥ .8	89	3	56	0	6	15	16	56	41	69	102
.6>x≥ .7	1	3	31	0	8	10	34	20	20	67	118
.5>x≥ .6	58	5	31	35	2	10	29	24	8	96	66
.4>x≥ .5	2	1	18	0	1	5	18	23	2	108	69
.3>x≥ .4	3	1	14	0	3	7	20	23	0	57	44
.2>x≥ .3	16	1	20	11	1	4	13	5	4	22	1
.1>x≥ .2	0	0	0	0	0	1	0	0	0	0	0
X≤ .1	0	0	0	0	0	1	0	0	0	0	1

Explanation: what the classes indicate.

In Table 5 we take another view to cohesion. Instead of party groups, we want to see how cohesive the MPs are within the election districts that they were chosen from. There are 14 election districts (excluding Åland with only one MP), and we use the same sub grouping of the votes as in table 3 above. As expected, the cohesion values

are lower compared to the party groups, since within the districts candidates from more than just one party were elected. Only two districts (esa and pkr) show considerably higher cohesion compared to others. With respect to the 'esa' district, the high cohesion is not surprising, since only one MP out of the six elected represents an opposition group. Regarding pkr, the situation is similar: from the seven elected MPs only one represents an opposition group.

Table 5. Eduskunta's agreement index values by election district for the year 2003

	kym	***vaa***	***hel***	***sat***	***lap***	***esa***	***v-s***	***kes***	***pkr***	***häm***	***pir***	***uus***	***psa***	***oul***
all	.701	.736	.600	.708	.593	.864	.591	.683	.868	.662	.614	.623	.599	.644
All –b	.680	.726	.568	.644	.585	.873	.570	.622	.880	.639	.577	.565	.583	.600
Only b	.710	.740	.615	.736	.597	.859	.601	.710	.862	.672	.631	.649	.606	.664
1st c	.614	.656	.508	.654	.543	.828	.530	.602	.841	.580	.488	.507	.556	.550
2nd c	.740	.713	.558	.653	.603	.929	.591	.594	.852	.635	.591	.578	.559	.559

District abbreviations: kym = Kymi, vaa = Vaasa, hel = Helsinki, sat = Satakunta, lap = Lappi, esa = Etelä-Savo, v-s = Varsinaissuomi, kes = Keski-Suomi, pkr = Pohjois-Karjala, häm = Häme, pir = Pirkanmaa, uus = Uusimaa, psa = Pohjois-Savo, oul = Oulu.

Raunio collected and compared group cohesion studies among several parliaments in his PhD thesis (Raunio 1996, 136-139). Although his thesis is already a few years old, it includes the most recent data available. A verified, corrected and updated comparison is presented in Table 6.

It has to be stressed that comparing group cohesion among the various studies is not entirely straightforward, since the applied indices are partly different. Firstly, most studies have applied the original Rice index, while two apply the Hix et al. (2004) variant. However, the differences in the index variants are not crucial. Moreover, Skjaeveland (1999; 2001), and Cox and McCubbins (1991) use rather different measuring methods. The second problem is that the results are from quite different time periods. Finally, the political systems are different: the US Congress and the Swiss National Council are federal systems, while the EP is a transnational parliament, other parliaments being non-federal national ones. However, we can make some rough observations.

Comparing the Eduskunta's 2003 group cohesion to the old results by Nyholm (1961; 1969; Nyholm and Hagfors 1968) in Table 6, there is no major difference. Only the minimum level cohesion has risen. In fact, the least cohesive group R is nowadays the most cohesive. Thus, based on our data, we can confirm Raunio's (1996) suspicion that the cohesion probably had not changed since the studies of Nyholm.

When we compare Eduskunta to Scandinavian parliaments, the Finnish parliamentary party groups act roughly as cohesively as their Swedish colleagues (Clausen and Holmberg 1977). Party groups in the two other parliaments, the Danish and the Norwegian, are more cohesive. As Rasch (1999) reports, the cohesion is 95% or over, for nearly all party groups in the Norwegian parliament. The case for Denmark is similar, as Skjæveland's (1999; 2001) analyses point in this direction. Note, however, that the Rice index values are not available for the Danish Folketing. Instead Skjæveland uses a party breach frequency measure. By looking at the respective breach frequencies, they would most probably produce the Norwegian level of cohesion, if not even higher.[7]

Comparing Eduskunta to other parliaments we can see from Table 6 that the lowest levels of cohesion appear in the EP and the Swiss National Council, while other parliaments appear to be in the level of Eduskunta. The highest levels of cohesion are mostly at the level of Eduskunta, while the US Congress appears to be considerably less cohesive. Outside Scandinavia the German Bundestag seems to be nearly as cohesive as Eduskunta.

[7]Actually, Skjæveland (1999) suspects that the Folketing could be the most cohesive parliament in the world.

Table 6. Comparison of group cohesion in various parliaments

Parliament	*US Congress*	*European Parliament*	*Swiss National Council*	*(West) German Bundestag*	*Norway (Stort & Odelst)*	*Sweden Riksdag*	*Eduskunta*	*Eduskunta*
Year(s)	1933-1988	1979-2001	1920-1994	1949-1987	1979-1994	1967	1930-1954	2003
Cohesion lowest	79.3	53.5	60.1	81	93.3	88	63.7	81.7
Cohesion highest	80.7	93.4	98.2	100	99.6	95	95.1	96.5
Reported in	Raunio's calculations (1996, 137) from Cox & McCubbins (1991)	Hix et al. (2004)	Lafranchi& Lüthi (1999)	Saafeld (1990)	Rasch (1999)	Clausen & Holmberg (1977)	Nyholm & Hagfors (1968)	Table 3 in this study

Note: European Parliament and Eduskunta 2003 apply the Agreement Index, and all others apply the Rice index.

Voting similarity and latent variable analyses

Cluster dendrogram

The voting similarity analysis as such produces distances between MPs. The distances can be summarised in a dissimilarity matrix. The matrix is 200 * 200 MPs in size, and it is not feasible to include it in the article. The voting similarity scores, or distance scores, are also very uninformative and hard to comprehend. The matrix is like a city-distance table sometimes included in road maps. A much more human readable form of the matrix is a cluster dendrogram.

We employed the agglomerative hierarchical clustering algorithm *agnes* (Kaufman and Rousseeuw, 1990) with the average linkage method, and produced the dendrogram in Figure 1. Hierarchical clustering works by first subdividing all MPs into clusters, so that each MP forms his or her own cluster. In successive steps, the clustering algorithm finds the closest pair of clusters and merges them into a single one. The merging is graphically indicated as a fork in the dendrogram. If the two clusters are close, the fork is darker and horizontally shorter. The average linkage method defines the proximity between two clusters *A* and *B* as the average proximity

among all pairs of MPs from *A* and *B*, so that one MP in the pair is a member of *A*, and the other of *B*.

The figure should be approached with caution in one respect. The dendrogram has a feature with which the clusters can be re-arranged, as far as the 'paths' to individual MPs allow it. Thus, the dendrogram does not represent the left-right dimension, although the clusters could be arranged accordingly. Instead, the dendrogram in Figure 1 is arranged to highlight the cabinet-opposition division. We have also listed the party affiliations and election districts next to the MPs' names.
As a rule of thumb, the closer the MPs are in the clusters, the more similarly they vote. The dendrogram also indicates the intensity of the voting likeness with colours of the branches: black indicates a strong connection, while light grey indicates a weak connection. The outcome, which is also located in the dendrogram, can be seen as the 201st MP (the outcome, with only one exception, was always 'yes', as can be seen in Table 1).

After one becomes familiar with the logic of the dendrogram in Figure 1, it is rather easy to read. The dendrogram is full of interesting findings. Starting from the left of the dendrogram, the first division is between everyone else and a small cluster containing MPs Lehtomäki (minister), Vanhanen (prime minister), Lipponen (speaker of Eduskunta) and Tahvanainen (regular MP). Since the MPs in this cluster represent a rather special division in what comes to the status of these MPs, an explanation is needed. This small cluster is a good example of an illusion, or side effect, which the pair-wise vote comparison sometimes produces. Obviously, the voting behaviour of these MPs is very deviant from everyone else. The Lipponen-Tahvanainen pair is a result of being absent from the votes. Lipponen is the speaker, and so he hasn't participated in the votes. Tahvanainen, in turn, has been on leave for almost the whole year. Absence from the votes explains partly also the Vanhanen-Lehtomäki pair. The other part is that whenever they voted, they always pushed the 'yes' button. Note that the connection between these MPs is very weak.

Next we can see the two main clusters of the dendrogram, which make a rather clear division between the cabinet groups' MPs and the opposition groups. There is only

one exception: the PS group is surprisingly in the edge of the cabinet coalition cluster. The connection to the cabinet cluster is very weak, moreover, this phenomenon is explained below with the latent variable analysis.

The division between the opposition groups is very strict, as none of the opposition party groups overlap one with another. The KOK cluster is right above the cabinet cluster, together with the KD cluster. Going up we can next see the VIHR and VAS cluster, which is again strictly divided into two. The cabinet groups, in the other hand, do overlap a bit. The general pattern seems to be that the SD and KESK groups' MPs tend to be in separate sub clusters, however, in the following level(s) large sub clusters there is some overlapping. The R groups' MPs are all in the same sub cluster, however in the next level they are accompanied by one SD and two KESK MPs. The MP closest to the outcome, and has thus voted the most similarly to the vote outcome, is Minister and MP Antti Kalliomäki (SD). Examples of strong connections (black links) are clusters near the outcome. Readers familiar with Finnish party politics are able to find lots of other interesting details.

The districts of the MPs also reveal some interesting findings. There are several pairs of MPs from same district (and same party), who are next to each other, and thus vote very similarly. Also some larger regional clusters exist, for example, the Vaasa cluster (KESK MPs together with two SD MPs), or the Varsinais-Suomi (v-s) cluster containing MPs from SD and KESK.

[FIGURE 1 ABOUT HERE]

Latent variable 15-bloc analysis

Figure 1 also includes the latent variable analysis results. The respective grey scale squaring is located to the right of the dendrogram. The underlying mathematical evaluation (best value for K) suggests that the Eduskunta is best explained as a 15 bloc voting system. As can be seen, one MP can belong to multiple blocs. Interpreting the results we note that the darker a square, the higher the probability that a voter belongs to the respective bloc. Note also that the probabilities of belonging to the various blocs for an individual MP sum to one. MP Kalliomäki, for example, only

belongs to one bloc (with the probability of one). If an MP belongs to two blocs, and the colour of the bloc squares are equally grey, the probabilities are 0.5 and 0.5 for each bloc.

The cabinet coalition party groups seem to form more or less one large bloc. Some nuances within the cabinet bloc do exist. MPs from Mari Kiviniemi up to Harry Wallin plus Henrik Lax up to Lauri Oinonen form one, and the fourth bloc from the right another. Few minor ones exist as well. The latent variable analysis was also able to explain nuances, which appear strange in the dendrogram. The PS cluster in the edge of the cabinet cluster does not belong to the cabinet bloc. In fact, the PS MPs form another bloc together with VAS and KD.

From the opposition party groups, VIHR is again very cohesive, as it consists of only one single bloc. With respect to the VAS and KD groups, they are divided into two blocs each. The 'main' blocs in both groups are quite distinctive, while the 'second' blocs seem to indicate little cooperation between VAS, KD and also PS party groups. KOK seems to be divided more or less into three blocs.

Finally, worth noting is that cabinet and opposition group MPs do not seem to belong to the same blocs. Accordingly, the division between cabinet – opposition groups is very strict, as the clustering in the dendrogram already suggested.

5 Discussion

The descriptive Section 2 of the article provided a basic picture of voting in Eduskunta. Firstly, in plenary sessions the Eduskunta were almost completely unanimous about everything in year 2003 in one respect, as only 3.4 % of all processed issues were voted upon. In fact, a similar pattern appeared for years 1999-2002 as well. The few issues that were voted upon required maximally 10 votes, while a 'normal' case were one or two votes. An exception was the budget amendments, as these produced hundreds of votes (over 70% of all). Altogether, there were 517 counter proposals or amendments (ponsi), which resulted in 491 votes in year 2003, and nearly 93 % of the proposals came from the opposition MPs. One is tempted to

say here, by looking at Table 1, that the voting in Eduskunta is a mere ritual, where proposals made by the opposition are systematically discarded by the governing cabinet coalition. However, it must be stressed that the plenary sessions are only a small fraction of the work done in Eduskunta. The preparing stages in the various committees play an important role and include most of the work. Unfortunately, very little is known about the work in the committees. Moreover, probably most of the political disagreements are discussed and negotiated already in the committees.

The 2003 group cohesion in Eduskunta ranged from 0.817 to 0.965, so the Finnish parliament is indeed very cohesive. Four out of eight party groups have a cohesion score greater than 0.9. The results confirm Raunio's (1996, 137) suspicion that the cohesion has not changed considerably from the 1950s, when the last respective studies were carried out. As expected, it was found that the cohesion of the cabinet coalition (0.864) was greater than the opposition groups' (0.572). Analysing sub groups of votes revealed that the second (and final) considerations caused the highest levels of cohesion. Finally, comparing the Finnish group cohesion to six other countries, only the Norwegian and most probably the Danish parliaments are more cohesive.

Can we say that the political party groups were able to explain the voting behaviour of Eduskunta? Not quite, as the voting similarity analysis produced two main clusters, in which the most important division is between the cabinet coalition and the opposition groups. Inside the opposition cluster, the sub clusters strictly followed the opposition party group lines. However, among the cabinet sub cluster, the coalition groups overlapped a bit between the KESK and the SDP groups, while all the R groups' MP were in the same sub cluster. Accordingly, it seems that the voting is better explained as a cabinet coalition vs. opposition setting. More evidence pointing in this direction was found with the latent variable analysis, according to which the whole cabinet coalition basically acted as one bloc. However, few rather minor sub blocs existed within the cabinet bloc. Among the opposition blocs KOK and VIHR were found to be quite distinctive blocs, while a minor connection was found between VAS, KD and PS groups. Especially KOK and VAS included sub blocs.

Taken together, the cohesion, voting similarity and latent variable analyses supported each other rather nicely. The cohesion analysis provided the basic picture that the grouping most likely would follow the political party group lines. The voting similarity analysis, not assuming any predefined grouping, supported the cohesion results, was able to illustrate a large amount of detail within the voter groups, and also revealed that the group setting was in fact between the cabinet coalition and the opposition. Finally, the latent variable analysis was able to illustrate and explain some further peculiarities and nuances in the voting similarity cluster dendrogram.

References

Attiná, Fulvio. 1990. The Voting Behaviour of the European Parliament Members and the Problem of Europarties. *European Journal of Political Research* 18, pp. 557-79.

Ágh, Attila. 1999. The Parlamentarization of the East Central European Parliaments: Party Discipline in the Hungarian Parliament, 1990-1996. In Bowler, Shaun, Farrell , David M. and Katz, Richard S. (eds), *Party discipline and parliamentary government*. Columbus: Ohio State University Press.

Beyle, Herman C. 1931. *Identification and Analysis of Attribute-Cluster-Blocs*. Chigago: University of Chigago Press.

Clausen, Aage R. and Holmberg, Sören. 1977. Legislative Voting Analysis: The Swedish Case. In William O. Aydelotte (ed), *The History of Parliamentary Behaviour*. Princeton, N.J: Princeton U.P.

Collie, Melissa P. 1985. Voting Behavior in Legislatures. In Lowenberg, Gerhard, Patterson, Samuel C. and Malcolm E. Jewell (eds), *Handbook of Legislative Research*. Cambridge, Mass.: Harvard University Press.

Constitution of Finland. 2000. Came into force March 1st 2000. English translation is obtainable through <URL:http://www.finlex.fi/pdf/saadkaan/E9990731.PDF>.

Cox, Gary and McCubbins, Matthew D. 1991. On the Decline of Party Voting in Congress. *Legislative studies quarterly* 16(4), pp. 547-570.

Geman, S. and Geman, D. 1984. Stochastic Relaxation, Gibbs Distributions, and the Bayesian Relation of Images. *IEEE Trans Pattern Anal Machine Intell* 6, pp. 721–741.

Heiskanen, Ilkka. 1963. Edustajaryhmien äänestyskäyttäytyminen ja politiikan teoria. *Politiikka* 5(1), pp. 24-32.

Hofmann, T. 1999. Probabilistic Latent Semantic Indexing. *ACM SIGIR Conference on Research and Development in Information Retrieval*, pp. 50–57.

Hix, Simon, Noury, Abdul and Roland, Gérard. 2004. Power to The Parties: Cohesion and Competition in the European Parliament, 1979-2001. *British Journal of Political Science*. (Forthcoming.)

Kaufman, L. and Rousseeuw, P. J. 1990. *Finding Groups in Data.* New York: Wiley.

Lanfranchi, Prisca and Lüthi, Ruth. 1999. Cohesion of Party Groups and Interparty Conflict in the Swiss Parliament: Roll call Voting in the National Council. In Bowler, Shaun, Farrell, David M. and Katz, Richard S. (eds), *Party discipline and parliamentary government*. Columbus: Ohio State University Press.

Lee, D. and Seung, H. 1999. Learning the parts of objects by non-negative matrix factorization. *Nature* 401, pp. 788–791.

Mellanen, Niko. 1999. Eduskuntaryhmien yhtenäisyys vaalikaudella 1995-1999. Unpublished MA thesis. Department of Political Science, University of Turku.

Nurmi, Hannu and Nurmi, Lasse. 2004. The parliamentary election in Finland, March 2003. *Electoral Studies* 23, pp. 557-565.

Nyholm, Pekka. 1969. Eduskuntaryhmien kannanottojen keskinäisestä vertaamisesta. *Politiikka* 11(1), pp. 6-15.

Nyholm, Pekka. 1969. *Suomen eduskuntaryhmien koheesio vuosien 1948-51 vaalikaudella ja vuoden 1954 valtiopäivillä*. PhD thesis. Publications of Suomen tiedeseura No. 106.

Nyholm, Pekka. 1959. Havaintoja eduskuntaryhmien koheesiosta vaalikaudella 1948-51. *Politiikka* 1(1), pp. 42-52.

Nyholm, Pekka and Hagfors, Carl. 1968. *Ryhmäyhtenäisyyden kehityksestä Eduskunnassa 1930-1954*. Research report No. 14/1968. Institute of Political Science, University of Helsinki.

Pritchard, J. K. Stephens, M. and Donnelly, P. J. 2000. Inference of population structure using multilocus genotype data. *Genetics* 155, pp. 945–959.

Rajski, C. 1961. A metric space of discrete probability distributions. *Information and Control* 4, pp. 373-377.

Rasch, Bjørn E. 1999. Electoral Systems, Parliamentary Committees, and Party Discipline: The Norwegian Storting in a Comparative Perspect. In Bowler, Shaun, Farrell , David M. and Katz, Richard S. (eds), *Party discipline and parliamentary government*. Columbus: Ohio State University Press.

Raunio, Tapio. 1999. The Challenge of Diversity: Party Cohesion in the European Parliament. In Bowler, Shaun, Farrell, David M. and Katz, Richard S. (eds), *Party discipline and parliamentary government*. Columbus: Ohio State University Press.

Raunio, Tapio. 1996. *Party Group Behaviour in the European Parliament*. PhD Thesis. Acta Universitatis Tamperensis, ser A Vol. 521. Tampere: University of Tampere.

Rice, Stuart A. 1928. *Quantitative Methods in Politics*. New York: Knopf.

Saafeld, Thomas. 1990. The West German Bundestag after 40 Years: The Role of Parliament in a 'Party Democracy". *West European Politics* 13(3), pp. 68-89.

Sánchez de Dios, Manuel. 1999. Parliamentary Party Discipline in Spain. In Bowler, Shaun, Farrell, David M. and Katz, Richard S. (eds), *Party discipline and parliamentary government*. Columbus: Ohio State University Press.

Shannon, C. E. 1948. A mathematical theory of communication. *The Bell System*

Technical Journal 27, pp. 623-656.

Skjæveland, Asbjorn. 2001. Party Cohesion in the Danish Parliament. *Journal of Legislative Studies* 7(2), pp. 35-56.

Skjæveland, Asbjorn. 1999. A Danish Party Cohesion Cycle. *Scandinavian Political Studies* 22(2), pp. 121-136.

Svensson, Palle. 1982. Party Cohesion in the Danish Parliament during the 1970s. *Scandinavian Polical Studies* 5(1), pp. 17-42.

Sänkiaho, Risto. 1966. Äänestysvoimakkuudesta Eduskunnassa v. 1951-66. *Politiikka* 8(4), pp. 179-189.

Truman, David B. 1959. *The Congressional Party: A Case Study*. New York: John Wiley & sons.

Wiberg, Matti. 1989. Valtiosäännön vapaudessa, mutta ryhmäsääntöjen puristuksessa: Kansanedustajien ryhmäkulttuurin nykytila. *Politiikka* 31(3), pp. 201-213.

Wiberg, Matti. 2000. The Partyness of the Finnish Eduskunta. In Heidar, Knut and Koole, Ruud (eds), *Parliamentary Party Groups in European Democracies: Political Parties behind Closed Doors*. London – New York: Routledge / ECPR Studies in European Political Science.

Woodbury, M. A. and Manton, K. G. 1982. A new procedure for analysis of medical classification. *Methods Inf Med* 21, pp. 210–220.

Özbudun, Ergun. 1970. *Party cohesion in western democracies: a causal analysis*. Beverly Hills, Calif.: Sage Publications.

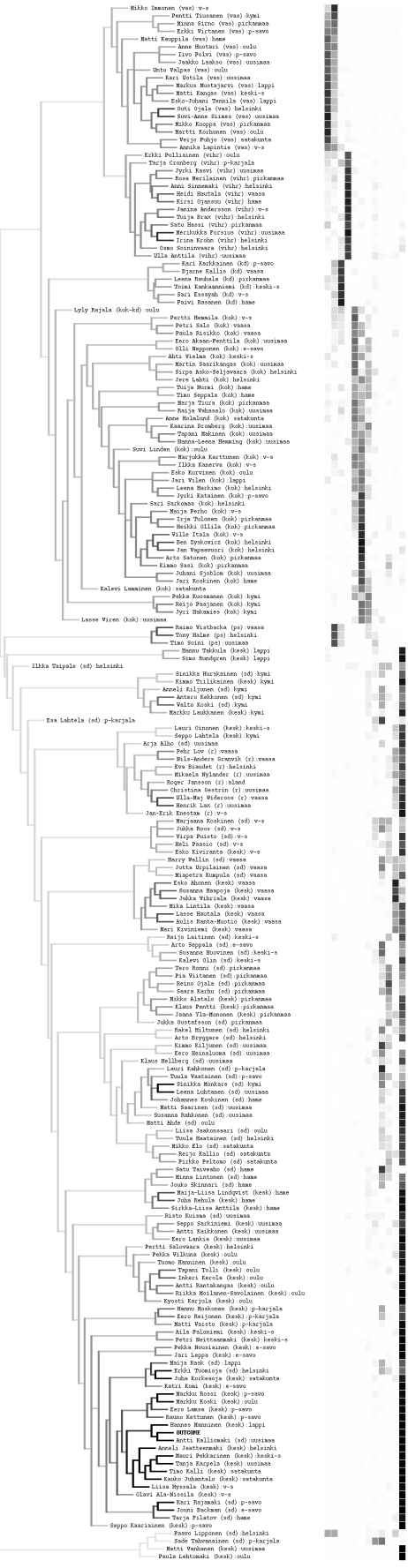
Mikko Immonen (vas) :v-s
Pentti Tiusanen (vas) :kymi
Minna Sirno (vas) :pirkanmaa
Erkki Virtanen (vas) :p-savo
Matti Kauppila (vas) :hame
Anne Huotari (vas) :oulu
Iivo Polvi (vas) :p-savo
Jaakko Laakso (vas) :uusimaa
Unto Valpas (vas) :oulu
Kari Uotila (vas) :uusimaa
Markus Mustajarvi (vas) :lappi
Matti Kangas (vas) :keski-s
Esko-Juhani Tennilla (vas) :lappi
Outi Ojala (vas) :helsinki
Suvi-Anne Siimes (vas) :uusimaa
Mikko Kuoppa (vas) :pirkanmaa
Martti Korhonen (vas) :oulu
Veijo Puhjo (vas) :satakunta
Annika Lapintie (vas) :v-s
Erkki Pulliainen (vihr) :oulu
Tarja Cronberg (vihr) :p-karjala
Pyrki Kauvi (vihr) :uusimaa
Rosa Meriläinen (vihr) :pirkanmaa
Anni Sinnemäki (vihr) :helsinki
Heidi Hautala (vihr) :vaasa
Kirsi Ojansuu (vihr) :hame
Janina Andersson (vihr) :v-s
Tuija Brax (vihr) :helsinki
Satu Hassi (vihr) :pirkanmaa
Merikukka Forsius (vihr) :uusimaa
Irina Krohn (vihr) :helsinki
Osmo Soininvaara (vihr) :helsinki
Ulla Anttila (vihr) :uusimaa
Kari Kaikkonen (kd) :p-savo
Sjaane Kallis (kd) :vaasa
Leena Rauhala (kd) :pirkanmaa
Toimi Kankaanniemi (kd) :keski-s
Sari Essayah (kd) :v-s
Paivi Rasanen (kd) :hame
Lyly Rajala (kok-kd) :oulu
Pertti Hemmila (kok) :v-s
Petri Salo (kok) :vaasa
Paula Risikko (kok) :vaasa
Eero Akaan-Penttila (kok) :uusimaa
Olli Heggonen (kok) :e-savo
Ahti Vielma (kok) :keski-s
Martin Saarikangas (kok) :uusimaa
Sirpa Asko-Seljavaara (kok) :helsinki
Jere Lahti (kok) :helsinki
Tuija Nurmi (kok) :hame
Timo Seppala (kok) :hame
Marja Tiura (kok) :pirkanmaa
Raija Vahasalo (kok) :uusimaa
Anne Holmlund (kok) :satakunta
Kaarina Dromberg (kok) :uusimaa
Tapani Mahonen (kok) :uusimaa
Hanna-Leena Hemming (kok) :uusimaa
Suvi Linden (kok) :oulu
Marjukka Karttunen (kok) :v-s
Ilkka Kanerva (kok) :v-s
Esko Kurvinen (kok) :oulu
Jari Vilen (kok) :lappi
Leena Harkimo (kok) :helsinki
Jyrki Katainen (kok) :p-savo
Sari Sarkomaa (kok) :helsinki
Maija Perho (kok) :v-s
Irja Tulosen (kok) :pirkanmaa
Heikki Ollila (kok) :pirkanmaa
Ville Itala (kok) :v-s
Ben Zyskowicz (kok) :helsinki
Jan Vapaavuori (kok) :helsinki
Arto Satonen (kok) :pirkanmaa
Kimmo Sasi (kok) :pirkanmaa
Juhani Sjoblom (kok) :uusimaa
Jari Koskinen (kok) :hame
Kalevi Lamminen (kok) :satakunta
Pekka Kuosmanen (kok) :kymi
Reijo Paajanen (kok) :kymi
Jyri Hakamies (kok) :kymi
Lasse Wiren (kok) :uusimaa
Raimo Vistbacka (ps) :vaasa
Tony Halme (ps) :helsinki
Timo Soini (ps) :uusimaa
Hannu Takkula (kesk) :lappi
Simo Rundgren (kesk) :lappi
Ilkka Taipale (sd) :helsinki
Sinikka Hurskainen (sd) :kymi
Kimmo Tiilikainen (kesk) :kymi
Anneli Kiljunen (sd) :kymi
Antero Kekkonen (sd) :kymi
Valto Koski (sd) :kymi
Markku Laukkanen (kesk) :kymi
Esa Lahtela (sd) :p-karjala
Lauri Oinonen (kesk) :keski-s
Seppo Lahtela (kesk) :kymi
Arja Alho (sd) :uusimaa
Pehr Low (r) :vaasa
Nils-Anders Granvik (r) :vaasa
Eva Biaudet (r) :helsinki
Mikaela Nylander (r) :uusimaa
Roger Jansson (r) :aland
Christina Gestrin (r) :uusimaa
Ulla-Maj Wideroos (r) :vaasa
Henrik Lax (r) :uusimaa
Jan-Erik Enestam (r) :v-s
Marjaana Koskinen (sd) :v-s
Jukka Rana (sd) :v-s
Virpa Puisto (sd) :v-s
Heli Paasio (sd) :v-s
Esko Kiviranta (kesk) :v-s
Harry Wallin (sd) :vaasa
Jutta Urpilainen (sd) :vaasa
Mirpetra Rampula (sd) :vaasa
Esko Ahonen (kesk) :vaasa
Susanna Haapoja (kesk) :vaasa
Jukka Vihriala (kesk) :vaasa
Mika Lintila (kesk) :vaasa
Lasse Hautala (kesk) :vaasa
Aulis Ranta-Muotio (kesk) :vaasa
Mari Kiviniemi (kesk) :vaasa
Reijo Laitinen (sd) :keski-s
Arto Seppala (sd) :e-savo
Susanna Huovinen (sd) :keski-s
Kalevi Olin (sd) :keski-s
Taro Ronni (sd) :pirkanmaa
Pia Viitanen (sd) :pirkanmaa
Reino Ojala (sd) :pirkanmaa
Saara Karhu (sd) :pirkanmaa
Mikko Alatalo (kesk) :pirkanmaa
Klaus Pentti (kesk) :pirkanmaa
Jaana Ilo-Kononen (kesk) :pirkanmaa
Jukka Oustafsson (sd) :pirkanmaa
Rakel Hiltunen (sd) :helsinki
Arto Bryggare (sd) :helsinki
Kimmo Kiljunen (sd) :uusimaa
Eero Heinaluoma (sd) :uusimaa
Klaus Hellberg (sd) :uusimaa
Lauri Kahkonen (sd) :p-karjala
Tuula Haatainen (sd) :p-savo
Sinikka Monkare (sd) :kymi
Leena Luhtanen (sd) :uusimaa
Johannes Koskinen (sd) :hame
Matti Saarinen (sd) :uusimaa
Susanna Rahkonen (sd) :uusimaa
Matti Ahde (sd) :oulu
Liisa Jaakonsaari (sd) :oulu
Tuula Haatainen (sd) :helsinki
Mikko Elo (sd) :satakunta
Reijo Kallio (sd) :satakunta
Pirkko Peltomo (sd) :satakunta
Satu Taavitsainen (sd) :hame
Minna Lintonen (sd) :hame
Jouko Skinnari (sd) :hame
Maija-Liisa Lindqvist (kesk) :hame
Juha Pehkola (kesk) :hame
Sirkka-Liisa Anttila (kesk) :hame
Risto Kuisma (sd) :uusimaa
Seppo Sarkiniemi (kesk) :uusimaa
Antti Kaikkonen (kesk) :uusimaa
Eero Lankia (kesk) :uusimaa
Pertti Salovaara (kesk) :helsinki
Pekka Vilkuna (kesk) :oulu
Tuomo Hannunen (kesk) :oulu
Tapani Tolli (kesk) :oulu
Inkeri Kerola (kesk) :oulu
Antti Rantakangas (kesk) :oulu
Riikka Moilanen-Savolainen (kesk) :oulu
Kyosti Karjula (kesk) :oulu
Hannu Hoskonen (kesk) :p-karjala
Eero Reijonen (kesk) :p-karjala
Matti Vanhanen (kesk) :p-karjala
Aila Paloniemi (kesk) :keski-s
Petri Neittaanmaki (kesk) :keski-s
Pekka Housiainen (kesk) :e-savo
Jari Leppa (kesk) :e-savo
Maija Rask (sd) :lappi
Erkki Tuomioja (sd) :helsinki
Juha Korkeaoja (kesk) :satakunta
Katri Komi (kesk) :e-savo
Markku Rossi (kesk) :p-savo
Markku Koski (kesk) :oulu
Eero Lamsa (kesk) :p-savo
Rauno Kettunen (kesk) :p-savo
Hannes Hannunen (kesk) :lappi
OUTCORE
Antti Kalliomaki (sd) :uusimaa
Anneli Jaatteenmaki (kesk) :helsinki
Mauri Pekkarinen (kesk) :keski-s
Tanja Karpela (kesk) :uusimaa
Timo Kalli (kesk) :satakunta
Kauko Juhantalo (kesk) :satakunta
Liisa Hyssala (kesk) :v-s
Olavi Ala-Nissila (kesk) :v-s
Kari Rajamaki (sd) :p-savo
Jouni Backman (sd) :e-savo
Tarja Filatov (sd) :hame
Seppo Kaarainen (kesk) :p-savo
Paavo Lipponen (sd) :helsinki
Sade Tahvanainen (sd) :p-karjala
Matti Vanhanen (kesk) :uusimaa
Paula Lehtomaki (kesk) :oulu

Figure 1.